priately devoted tc considering the different conceptions which have been held with regard to matter, culminating in the theory of atomic disintegration, which had its birth in Montreal in 1902.

AT the end of an interesting and instructive paper in a recent number of the *Chemiker Zeitung* (No. 61, p. 742) on the chemical composition of the eruptive products of volcanic actions, and more especially that of Vesuvius in April of this year, Prof. Julius Stoklasa, of Prague, directs attention to the meagre primitive equipment of the Royal Seismological Observatory situated in the immediate neighbourhood of Vesuvius, where on April 3 Prof. Matteucci observed the first subterranean signs of this year's eruption, and which Prof. Stoklasa visited in May last. In this article Prof. Stoklasa throws out the suggestion that the observatory should be re-modelled and made an international experimental station with geophysical and chemical laboratories, similar, in fact, to the International Biological Station at Naples, which is being provided with extensions to its physiological and chemical laboratories for the purpose of more thoroughly investigating marine fauna and flora.

IN 1903, from the occurrence of a number of lines common to the spectra of krypton and xenon, Dr. Baly inferred the existence of a new element present as an impurity in those gases. From a study of the spectra of different fractions of the most easily condensable portion of the inert gases of the atmosphere, Dr. Rudolf Schmidt now concludes in the *Verhandlungen* of the German Physical Society (vol. viii., No. 14) that xenon is not a true element, but a mixture, possibly of several gases. The ultra-violet spectrum between $\lambda=3450$ and $\lambda=2800$ of one fraction of the gas was found to contain only about forty lines, the greater part corresponding with those ascribed to xenon; several, however, were new. Within the same range Baly measured about 500 lines, and the difference in the two numbers might at first sight appear to be due to insufficient illumination in the one case. This view is contradicted, however, by the fact that some of the lines which appeared feeblest in Baly's spectra showed the greatest intensity in the case of this particular fraction, whilst all the brightest lines of "xenon" were missing. The only explanation appears to be that the gas hitherto called xenon is a more or less complex mixture.

THE Country Press, 19 Ball Street, Kensington, W., has added to its series of nature-study picture postcards twelve cards, which may be obtained for one shilling, depicting twenty-three species of British grasses. The popular and botanical names are given in each case, together with the time of flowering and a magnified representation of the fructification.

THE Nagari-pracharina Sabha, of Benares, has published a "Hindi Scientific Glossary," containing the terms employed in most of the sciences, except biology and geology. The glossary has been edited by Mr. Syam Sundar Das, honorary secretary of the Nagari-pracharina Sabha, with the cooperation and assistance of an editorial committee. The glossary is divided into seven parts, dealing respectively with terms of geography, astronomy, political economy, chemistry, mathematics, physics, and philosophy. Preference has been given to common and current Hindi terms. In the absence of appropriate Hindi equivalents, certain appropriate terms existing in some of the prevalent vernaculars have been used. When these have failed, the existing Sanskrit terms have been taken or the English terms employed.

OUR ASTRONOMICAL COLUMN.

HOLMES'S COMET (1906*f*).—According to Prof. Wolf's telegram announcing its re-discovery, as published in No. 4118 of the *Astronomische Nachrichten*, the photographic magnitude of Holmes's comet on August 28 was 15·5. As the comet passed through perihelion on about March 14 it is not likely to become a brilliant object during the present apparition. The corrections to Dr. Zwiers's ephemeris are -6s. and $-2'$.

FINLAY'S COMET (1906*d*).—A continuation from M. L. Schulhof's ephemeris for Finlay's comet is given below:—

1906	α (app.) h. m.	δ (app.) ° ′	1906	α (app.) h. m.	δ (app.) ° ′
Sept. 15	6 40	+19 19	Sept. 23	7 7	+20 3
17	6 47	+19 33	25	7 13	+20 11
19	6 54	+19 44	27	7 19	+20 17
21	7 1	+19 54	29	7 24	+20 22

The comet will pass about 1° south of ζ Geminorum on September 20, and about 2° south of δ Geminorum on September 25.

COMET 1906*e* (KOPFF).—A further extract from Herr M. Ebell's ephemeris for Kopff's comet (1906*e*) is given below:—

Ephemeris (12*h*. *M.T. Berlin*).

1906	α (true) h. m.	δ (true) ° ′	Brightness
Sept. 16	22 33	+8 28	0·54
18	22 32	+8 16	
20	22 31	+8 4	0·48
22	22 31	+7 52	
24	22 30	+7 40	0·43
26	22 29	+7 28	
28	22 29	+7 16	0·38

Herr Ebell calculated two sets of elements, obtaining October 16, 1905, and May 14, 1906, as the respective times of perihelion passage, but, as seen from the residuals (observed-calculated), there is considerable uncertainty attaching to the calculated path.

Two other sets of elements, communicated by Prof. E. C. Pickering, give April 12, 1907, and December 7, 1906, respectively, as the time of perihelion, and the resultant ephemerides show the comet's brightness to be increasing at the present time. Observing at Hamburg on August 23, Dr. Graff found that the comet had a coma of $0'·5$ diameter, with a nucleus of magnitude 12·5, the magnitude of the whole being 11·5 (*Astronomische Nachrichten*, No. 4118).

THE PLANET MERCURY.—Continuing his articles in the *Observatory* (No. 374) on planets and planetary observations, Mr. Denning this month discusses the best times and methods of observing Mercury. Dealing with the legendary lament of Copernicus that he had never seen this planet, Mr. Denning expresses his doubts as to its authenticity. The late Rev. S. J. Johnson saw Mercury as an evening star about 150 times during the years 1858–1905, whilst Mr. Denning has seen it some 130 times since February, 1868, and suggests that, if looked for regularly, this elusive object may probably be seen on about fifteen occasions per annum in the English climate. In the spring, Mercury should be looked for some days *before* the maximum elongation, but in the autumn apparitions some days *after* the elongation. After discussing the observing conditions, Mr. Denning proceeds to describe the surface markings as seen—with great difficulty—on the telescopic image of Mercury since the time of Schröter.

OBSERVATIONS OF SATELLITES.—Prof. Barnard observed the sixth satellite of Jupiter nine times, on February 27 and March 20, during last winter, and found it quite an easy object, under fair weather conditions, with the 40-inch refractor of the Yerkes Observatory.

On February 27 the magnitude was 14·0, and on March 20, when Jupiter was lower down at the time of observation, it was estimated as 14·5. The positions determined from these observations are recorded in No. 4112 of the *Astronomische Nachrichten*.

In No. 4116 of the same journal the same observer

gives the results of his observations of Phœbe, the ninth satellite of Saturn, made with the 40-inch on July 24 and 29. The satellite was about 1m. in R.A. and 6′ in declination from the planet, and had a magnitude of 16·5; at times it appeared hazy. The observations give the following corrections, taken (observed-calculated), to Dr. Ross's ephemeris:—

	m. s.	′ ″
July 24	−0 0·93	+0 3·5
29	−0 0·87	+0 2·9

ENGINEERING AT THE BRITISH ASSOCIATION.

IN his presidential address to the section, Dr. Ewing dealt with certain aspects of the inner structure of metals and the manner in which they yield under strain, and he made a notable departure from the usual custom of such addresses by illustrating his speculations by experiments and by models in order to demonstrate his ideas as to the processes of crystal building.

After the presidential address a paper was read by Major W. E. Edwards, R.A., on modern armour and its attack. The author first gave a very complete and useful history of the application of armour to ships and forts, and then explained in detail the elaborate and costly processes through which the material passes, from the casting of the steel ingot to the completion of the plate. The second part of the paper dealt with the attack of armour and the various ways in which a plate may yield, and the influence of the cap in reducing the resisting power of hard-faced plates. In the discussion Sir William White expressed the opinion that British armour-plate makers had introduced many of the more important improvements in the resisting power of armour-plates, and that eventually the 6-inch gun would be chiefly used for defence against torpedo craft.

The first paper on Friday, August 3, was on the removal of dust and smoke from chimney gases, by Messrs. S. H. Davies and F. G. Fryer. The paper dealt with an ingenious plant the authors have designed and fitted up at the cocoa works of Messrs. Rowntree and Co. for thoroughly washing the smoke, and for removing from it the whole of the grit and dust and practically all the sulphur acids. Members of the section had an opportunity later on of seeing this plant in operation; it certainly thoroughly effects the purposes for which it was installed, and it might certainly be adopted with advantage in many factories where a cheap and plentiful supply of water is available.

In the next paper, on standardisation in British engineering practice, Sir John Wolfe-Barry gave an account of the admirable work which has been carried out by the Engineering Standards Committee since its first institution in 1901 at the instance of Sir John Wolfe-Barry himself. There are now thirty-six subcommittees with 260 members dealing with some thirty different branches of the work. The work of the committee has been invaluable both to manufacturers and to engineers, and the publications of the committee are indispensable to all engineers.

Dr. Ewing has during recent years done much valuable research work on the crystalline structure of metals, both in a strained and in an unstrained state, and it was only natural that there should be several papers on this important branch of the subject of the strength of materials. Mr. W. Rosenhain dealt with the deformation and fracture of iron and steel, and his paper was illustrated by a number of beautiful lantern slides. The author of this paper has done such admirable work in the microscopic study of the crystalline structure of metals that everything he has to say on this subject is sure to be of value. In his latest researches he has by a most ingenious method been able to study the crystalline structure of the actual fracture itself in broken test-pieces. The second paper on this subject of the crystalline structure of metals was by Mr. J. E. Stead, and dealt with segregation in steel ingots and its effect in modifying the mechanical properties of steel. To all those concerned either with the manufacture or with the employment of steel in industrial operations this paper was most valuable, for the author had brought together a large amount of information previously scattered in the pages of various publications. The microscopic study of the crystalline structure of different portions of steel ingots is rapidly changing the views of engineers in regard to many important problems in connection with the life of steel rails, and there is no question that the microscope now plays as important a part in the laboratory of the metallurgist as in that of the biologist.

Dr. H. C. H. Carpenter next read his paper on structural changes in nickel wire at high temperatures; this research, carried out at the National Physical Laboratory, was intended to throw light on the fact that fundamental changes occur in the mechanical properties of nickel wire used as the heating coil of an electrically-heated porcelain tube-furnace. Here again the microscope was the chief instrument in the research, and the study of the crystalline structure of the wires showed, the author suggested, that wire intended for electrical heating should be as free from gases as possible. A paper by Mr. W. Taylor describing a magnetic indicator of temperature for hardening steel concluded the day's proceedings.

On Saturday, August 4, the section paid a visit of inspection to the Roundhills Reservoir of the Harrogate Corporation. The dam, a masonry one, will, when completed, be 125 feet in height above the river bed, and members of the section were fortunate enough to see the work when the more difficult operations of such an undertaking were just in their most interesting condition.

On Monday, August 6, the first paper read was by Prof. Hudson Beare, on the new engineering laboratories of the University of Edinburgh and their equipment; the author pointed out that he had made special provision in these new laboratories for experimental work of an advanced character on the strength of materials and on hydraulics. At the conclusion of the discussion of this paper Sir W. H. Preece read a communication on glow lamps up to date, and the grading of voltages, in which he strongly advocated that steps should be taken to secure uniformity of practice in regard to regulation of voltage in connection with the distribution of electrical energy, and also in regard to the grading of carbon filament glow lamps; in the latter part of the paper data were given to show how poor in quality were many of the lamps on the English market. In the discussion on this paper Colonel Crompton directed attention to the fact that only a comparatively small proportion of lamps was used in private houses in America, while in this country the proportion was large; he also pointed out that the demand for electric current for power and for heating was now becoming a very important factor in the working of central stations.

In a paper on the advent of single-phase electric traction, Mr. C. F. Jenkin directed attention to the rapid advance of electric traction on railways, and pointed out its advantages. He pointed out that the real advantage of electrification was that it would make the line pay better. Mr. Jenkin then dealt with the two alternative systems—alternating current transmission, continuous current distribution with low-tension third rail, and alternating current transmission with high-tension trolley wire; he was of opinion that the latter method had very great advantages, and he advocated also single-phase instead of three-phase currents.

The business of the section for this day concluded with a paper by Mr. A. J. Martin on a general supply of gas for light, heat, and power production. Mr. Martin pointed out that the main obstacle to the general use of gas for purposes other than lighting was its cost, and that the chief causes of this high cost were the standards of illuminating value to which gas has to conform and the high prices paid for coal. At the present day both natural gas and coal gas have been piped in America to great distances (in the case of natural gas to 200 miles) with success, and Mr. Martin was of opinion that it would be perfectly feasible to generate gas cheaply at large works in the centre of our coalfields, and then to convey it under pressure to all our large cities for manufacturing and heating purposes.

In the course of the afternoon many members of the section took part in an excursion to Middlesbrough to visit